

A University Recommendation Model

for Chinese Students looking to Study

in Canada.

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1. Introduction

1.1 Background

Canada has been home to multiple of nationalities in the recent past. An influx of people from all around the world seeking jobs and education has graced the Canadian lands. Of great interest are the Chinese, whose numbers have been increasing greatly mainly due to educational reasons. However, the Chinese are a culturally diverse people and emigration poses a threat their culture, values and religion. Therefore, it is of great interest to the Chinese people that they find a home away from home whenever they leave their borders.

1.2 Problem & Interest

For students seeking education, the choice of University is largely affected by proximity to Chinese culture. Canada has some of the best universities in the world but that alone is not enough to lure Chinese students. Hence, I have set out to find which Universities will be of best interest to the Chinese people.

Canada Rank 2020	World University Rank 2020	University	Province	City
1	18	University of Toronto	Ontario	Toronto
2	34	University of British Columbia	British Columbia	Vancouver
3	42	McGill University	Quebec	Montreal
4	72	McMaster University	Ontario	Hamilton
5	85	University of Montreal	Quebec	Montreal
6	~136	University of Alberta	Alberta	Edmonton
7	~141	University of Ottawa	Ontario	Ottawa
~8	201-250	University of Calgary	Alberta	Calgary
~8	201-250	University of Waterloo	Ontario	Waterloo
~8	201-250	Western University	Ontario	London

Above is a snippet of the top 10 Universities in Canada and their overall global rankings. Any university that falls in this range is a fairly good university and after all analysis is done, the final check is to see whether the University falls in this range.

2. Data Acquisition and Cleaning

2.1 Data Sources

Population ethnicity data was collected mainly from Wikipedia and World Population Review for each Canadian province which is data from the 2016 Census.

A json file for Canada was also acquired from Statistics Canada which is the body responsible for statistics in Canada.

2.2 Data Cleaning

Data for each province was combined into a single table. Due to the insignificance of other nationalities I selected the top 7 Nationalities which are Canadian, English, Scottish, French, Irish, German and Chinese. For the small territories where ethnic data was unavailable, I saw it just to conclude that they are all of Canadian decent. This means for Northwest Territories, Yukon Territory and Nunavut the populations were assumed to be of Canadian ethnicity.

2.3 Feature Selection

After cleaning the dataset had 13 rows and 9 columns, the columns representing the various ethnicities and a total population column and the rows representing the various provinces and territories in Canada.

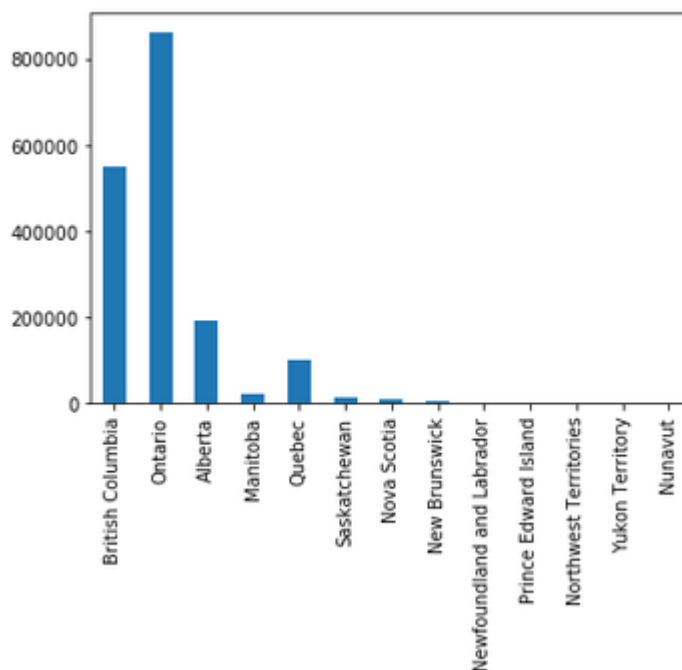
	Population	Canadian	English	Scottish	French	Irish	German	Chinese
ProvinceName								
Alberta	4067175	923248	919181	719889	418919	610076	728024	191157.0
British Columbia	4648055	883130	1226621	877552	396479	687912	614937	550329.0
Manitoba	1278365	232662	282518	236497	167465	171300	244167	18536.0
New Brunswick	747101	431675	171534	132461	200223	140977	28539	2241.0
Newfoundland and Labrador	519716	277580	204716	30975	28428	102539	6444	1143.0
Nova Scotia	923598	393452	266919	277079	152393	199497	98825	6465.0
Ontario	13448494	3157706	2852425	2139655	1370401	2127551	1207674	862048.0
Prince Edward Island	142907	64279	41071	54318	30439	39828	5787	225.0
Quebec	8164361	4906780	269424	220437	2351335	449039	146958	97972.0
Saskatchewan	1098352	206490	273489	207588	133998	170244	314128	10983.0
Northwest Territories	41786	41786	0	0	0	0	0	0.0
Yukon Territory	35874	35874	0	0	0	0	0	0.0
Nunavut	35944	35944	0	0	0	0	0	0.0

3. Exploratory data analysis

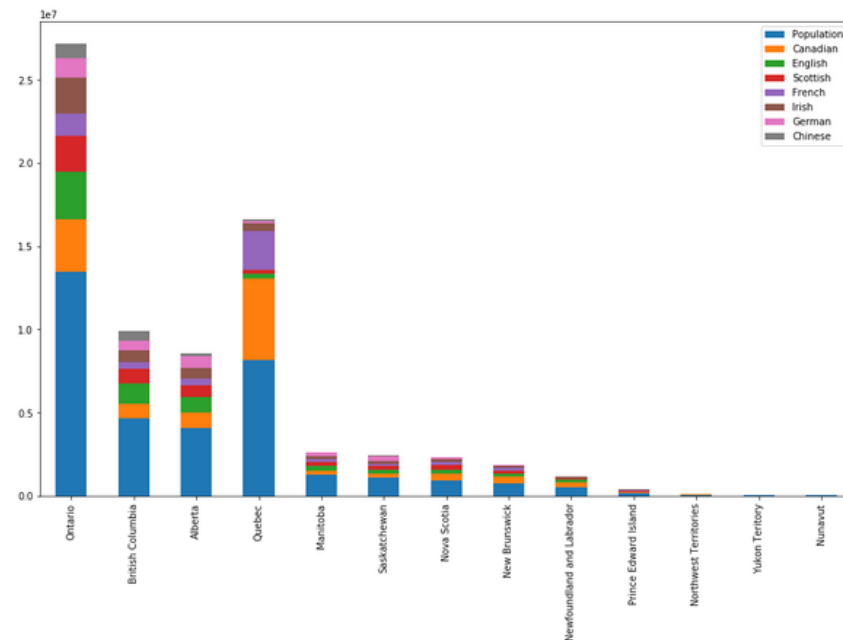
3.1 Ordering Dataset by Largest Chinese Population

The first step was to order the dataset by the largest Chinese population to determine which provinces have the highest number of Chinese ethnics. Evidently Ontario ranked first followed by British Columbia.

	Population	Canadian	English	Scottish	French	Irish	German	Chinese
ProvinceName								
Ontario	13448494	3157706	2852425	2139655	1370401	2127551	1207674	862048.0
British Columbia	4648055	883130	1226621	877552	396479	687912	614937	550329.0
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Prince Edward Island	142907	64279	41071	54318	30439	39828	5787	225.0
Northwest Territories	41786	41786	0	0	0	0	0	0.0
Yukon Territory	35874	35874	0	0	0	0	0	0.0
Nunavut	35944	35944	0	0	0	0	0	0.0



This was followed by a stacked bar chart to determine the significance of the Chinese population in each province.



Ontario and British Columbia are the only ones with a visible significant Chinese population.

	Population	Canadian	English	Scottish	French	Irish	German	Chinese	Proportion
ProvinceName									
British Columbia	4648055	883130	1226621	877552	396479	687912	614937	550329.0	0.118400
Ontario	13448494	3157706	2852425	2139655	1370401	2127551	1207674	862048.0	0.064100
Alberta	4067175	923248	919181	719889	418919	610076	728024	191157.0	0.047000
Manitoba	1278365	232662	282518	236497	167465	171300	244167	18536.0	0.014500
Quebec	8164361	4906780	269424	220437	2351335	449039	146958	97972.0	0.012000
Saskatchewan	1098352	206490	273489	207588	133998	170244	314128	10983.0	0.010000
Nova Scotia	923598	393452	266919	277079	152393	199497	98825	6465.0	0.007000
New Brunswick	747101	431675	171534	132461	200223	140977	28539	2241.0	0.003000
Newfoundland and Labrador	519716	277580	204716	30975	28428	102539	6444	1143.0	0.002199
Prince Edward Island	142907	64279	41071	54318	30439	39828	5787	225.0	0.001574
Northwest Territories	41786	41786	0	0	0	0	0	0.0	0.000000
Yukon Territory	35874	35874	0	0	0	0	0	0.0	0.000000
Nunavut	35944	35944	0	0	0	0	0	0.0	0.000000

The dataset ordered by Chinese nationals as a proportion of the total population is a favourable measure in which British Columbia and Ontario have the highest proportion of Chinese nationals.

4. Examining Neighbourhoods

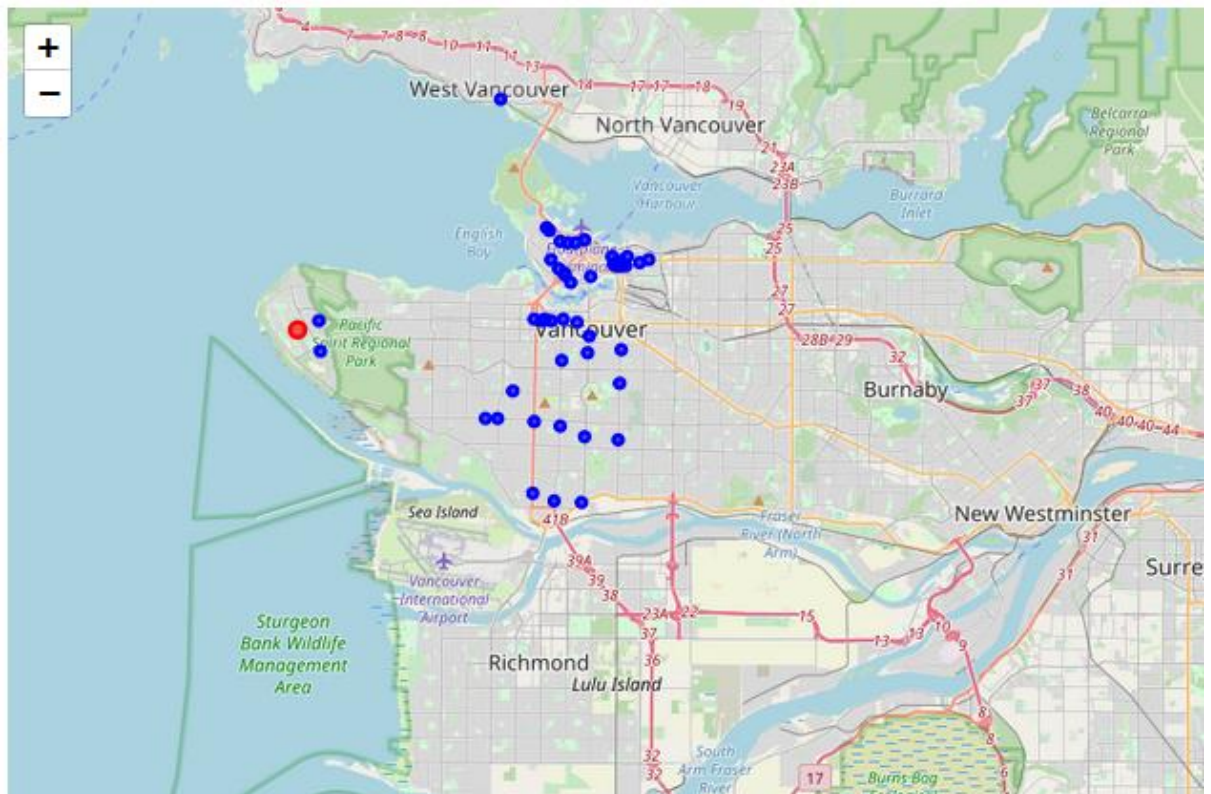
4.1 Summary

Now that it is clear that Ontario and British Columbia have the highest proportion of Canadian student, I'll move to examine neighbourhoods for each of the two provinces' top University which are University of Toronto and University of British Columbia respectively. I'll examine a 10km radius which I feel is a fair distance to travel to get required services and the query will detect anything in relation to the term 'Chinese.'

4.2 University of British Columbia

```
array(['Office', 'Chinese Restaurant', 'Embassy / Consulate',  
      'History Museum', 'General College & University',  
      'Cantonese Restaurant', 'Tea Room', 'Garden', 'Sports Club',  
      'Police Station', 'Herbs & Spices Store', 'Library',  
      'Shanghai Restaurant', 'Church', 'Dumpling Restaurant',  
      'Asian Restaurant', 'Dim Sum Restaurant', 'Medical Center',  
      'Korean Restaurant', 'Historic Site', 'Grocery Store'],  
      dtype=object)
```

The 10km radius consists of 21 unique categories that include Restaurants, Cultural Centers, Church and more importantly an embassy should things fall apart. This makes University of British Columbia an ideal university for Chinese nationals.

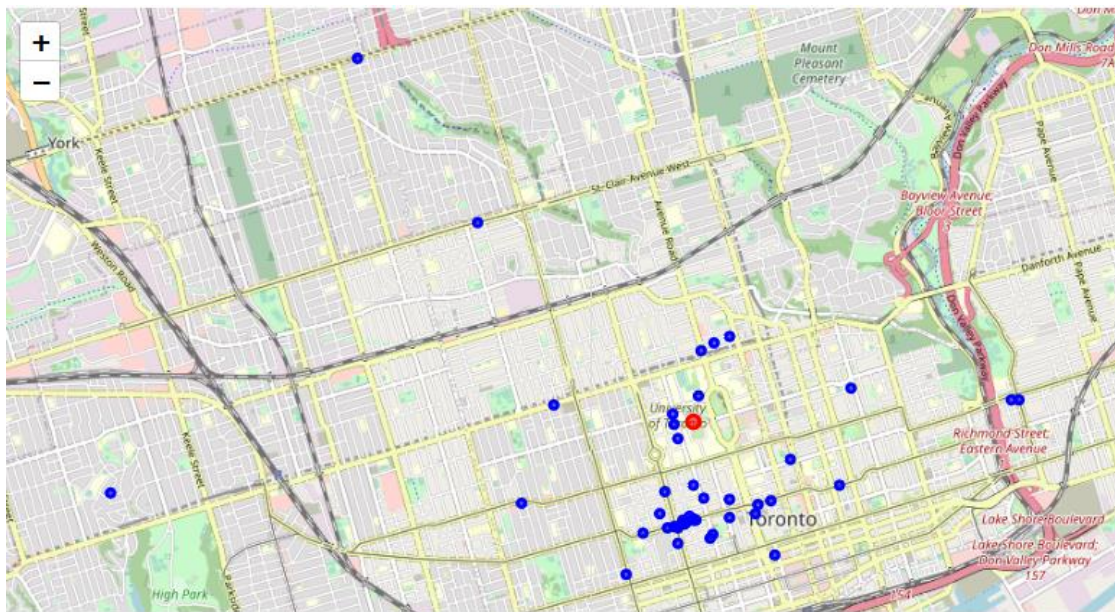


A visual representation of the neighbourhood shows a cluster of venues with a Chinese relation that is relatively accessible from the school.

4.3 University of Toronto

```
array(['Chinese Restaurant', 'Language School', 'Dim Sum Restaurant',
      'Food Truck', 'Miscellaneous Shop', 'Club House', 'Bakery',
      'Church', 'Temple', 'Government Building', 'Asian Restaurant',
      'Food Stand', 'Trade School', None, 'Historic Site',
      'Acupuncturist', 'Dumpling Restaurant', 'University',
      'Szechuan Restaurant', 'Sake Bar', "Doctor's Office",
      'Other Great Outdoors'], dtype=object)
```


Again, we see a similar setup to University of British Columbia. However, the lack of an embassy near University of Toronto is the only drawback. Visualising these places, we get the following:



The venues are favourably clustered around University of Toronto and better than the University of British Columbia.

5. Conclusion

All else being equal, the battle is left between University of British Columbia and University of Ontario. The neighbourhoods of these universities are fairly similar and have a decent distribution of Chinese venues. However, University of British Columbia edges it due to proximity to the embassy but considering Canada is a peaceful country that might not be such a big factor after all. Hence, I leave the final pick to personal preferences, but the search has been narrowed down to the two Universities that are located in the provinces with the most Chinese ethnics and closest to Chinese supplies.